FLOOD INSURANCE STUDY

VILLAGE OF SABINA, OHIO

CLINTON COUNTY

NOVEMBER 15, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 390627

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

VILLAGE OF SABINA,
CLINTON COUNTY,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Village of Sabina, Clinton County, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Geological Survey (USGS), (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 18. This study was completed in November 1987.

1.3 Coordination

On January 18, 1985, an initial meeting was held between representatives of FEMA; the Ohio Department of Natural Resources, Division of Water; the Village of Sabina; and the Study Contractor. Coordination with town officials and Federal and State agencies produced a variety of information pertaining to floodplain regulations, community maps, flood history, and other hydrologic data.

On October 13, 1988, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Sabina, Clinton County, Ohio. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of Wilson Creek and Mary's Fork was studied in detail.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through November 1992. The scope and methods of study were proposed to and agreed upon by FEMA and the Village of Sabina.

2.2 Community Description

The Village of Sabina is in northeastern Clinton County, approximately 10 miles southwest of the City of Washington Courthouse, Ohio, and is served by U.S. Route 22 and State Routes 3 and 729. The 1980 population of Sabina was reported to be 2,799 (Reference 1).

Soils in the study area are primarily of the Brookston and Crosby associations, which are characterized as dark-drained soils on depressed to gently sloping topography (Reference 2). The average annual precipitation in the study area is approximately 41 inches and distributed evenly throughout the year (Reference 3).

2.3 Principal Flood Problems

The low-lying areas adjacent to Wilson Creek and Mary's Fork within the Village of Sabina are subject to periodic flooding. The most extensive flooding in Sabina in recent history occurred in May 1968 (Reference 4). Residents reported severe flooding in the area adjacent to Mary's Fork between the CSX railroad and Wilmington Pike. Floodwaters were reported to be 6 inches deep on Ohio Street at one time during that flood. Flooding problems in this area are apparently aggravated by the constriction of flow caused by the CSX railroad bridge.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

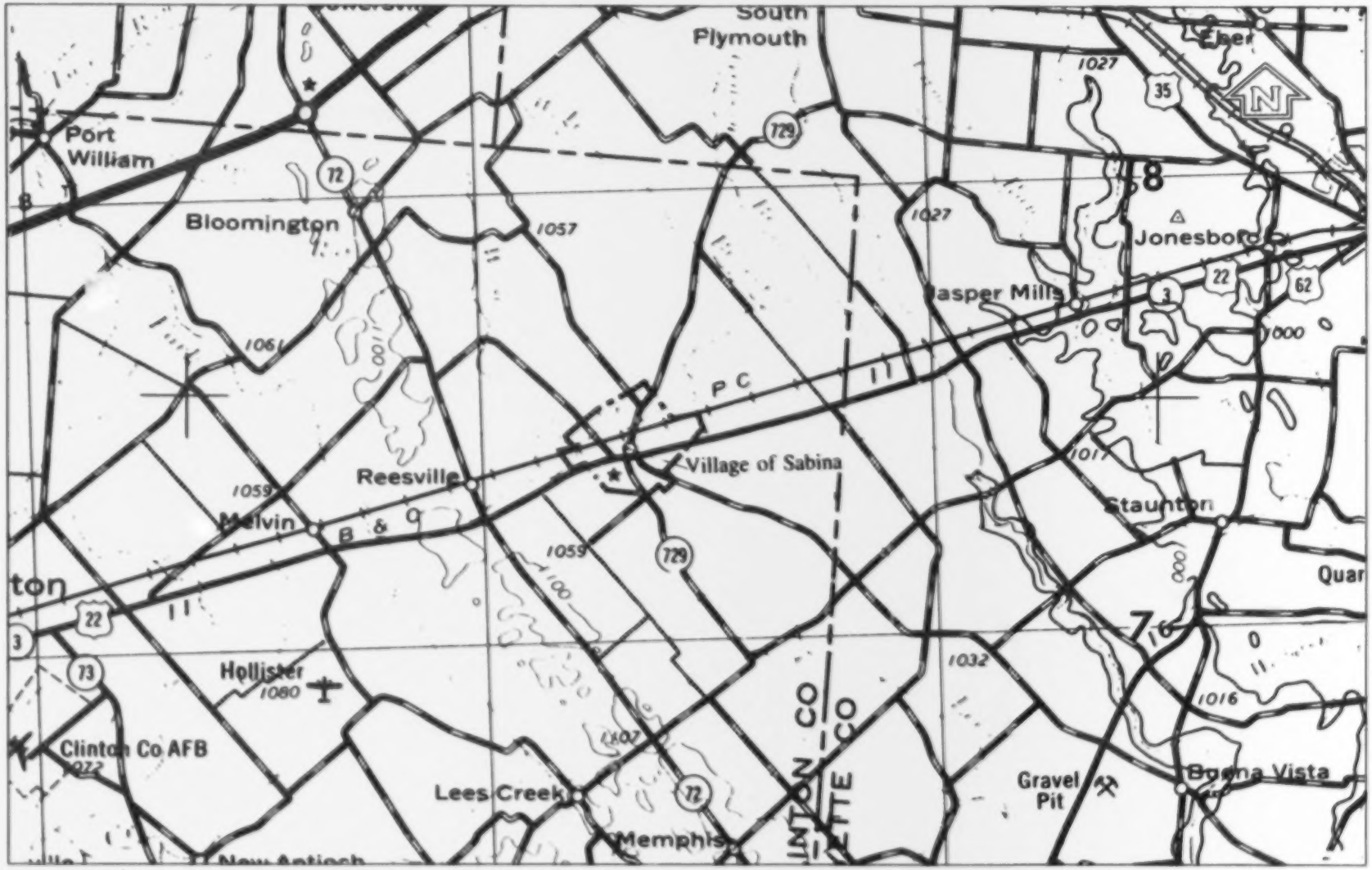


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF SABINA, OH
(CLINTON CO.)

APPROXIMATE SCALE
2 0 2 4 6 MILES

VICINITY MAP

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The magnitude of the discharges for the 100-year recurrence interval was determined in a study conducted by the U.S. Soil Conservation Service (SCS) (Reference 4). Estimates of the 100-year peak discharge were determined in that study using the SCS computer Model TR-20 (Reference 5). The TR-20 rainfall runoff model takes into account such factors as soil types, vegetation, topography, and precipitation.

Peak discharge-drainage area relationships for the 100-year flood of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS*) 100-YEAR
WILSON CREEK at downstream corporate limits	16.6	3,450

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 100-YEAR
MARY'S FORK		
at mouth	5.89	1,990
just upstream of confluence of Morris Ditch	2.32	759
at State Route 729	0.54	341

*cubic feet per second

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data were determined from field surveys. Cross-section data sites were determined by field surveys conducted for a study on the Rattlesnake Creek Watershed (Reference 4). Geometric data for bridges and culverts in the study were also determined from field surveys.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Roughness coefficients (Manning's "n") for the main channel and overbank areas were determined from field observations. Roughness values for Wilson Creek range from 0.04 to 0.06 for the channel and from 0.03 to 0.10 for the overbanks. On Mary's Fork, values range from 0.035 to 0.055 for the channel and from 0.03 to 0.10 for the overbanks.

Starting water-surface elevations for Wilson Creek were determined using standard slope-conveyance techniques. Starting water-surface elevations on Mary's Fork were not determined by slope-conveyance techniques due to the close proximity of the CSX railroad bridge to the mouth of Mary's Fork. Instead, the starting water-surface elevation on Mary's Fork was determined by routing the 100-year peak discharge up Wilson Creek to the confluence with Mary's Fork using standard step-backwater techniques. The water-surface elevation obtained at the confluence of Wilson Creek and Mary's Fork was used as the starting water-surface elevation for step-backwater computations on Mary's Fork.

The USGS step-backwater analysis program WSPRO (Reference 6) was used to determine water-surface profiles for this study.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 5 feet (Reference 7).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated, using topographic maps at a scale of 1:24000 with a contour interval of 5 feet (Reference 7).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment

so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway for Wilson Creek lie outside the corporate limits. No floodway was computed for Mary's Fork.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than 1.0-foot increase in the base flood elevations at any point within the community.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

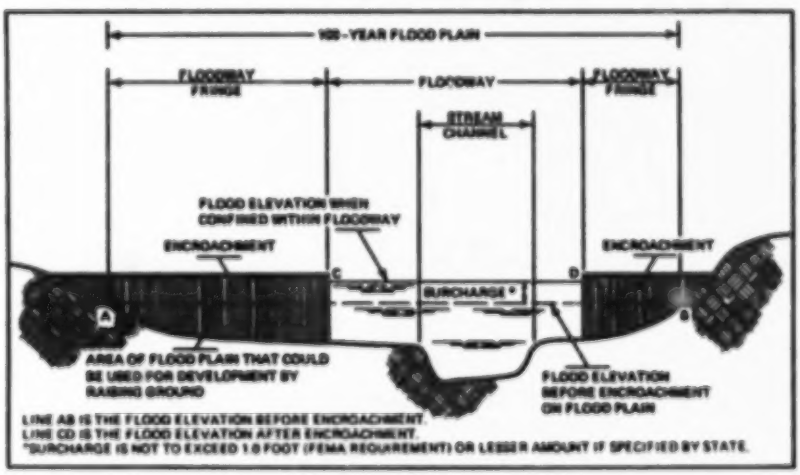

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
WILSON CREEK								
A	370	256	933	3.7	1032.5	1032.5	1033.5	1.0
B	618	145	544	6.3	1033.1	1033.1	1033.9	0.8
C	1193	290	1434	2.4	1035.3	1035.3	1035.9	0.6
D	3337	290	1339	2.6	1036.6	1036.6	1037.1	0.5
E	5036	220[2]	1255	2.8	1038.1	1038.1	1038.7	0.6
F	5967	200[3]	1380	2.5	1039.1	1039.1	1040.0	0.9
G	7053	400[2]	2116	1.6	1039.5	1039.5	1040.5	1.0

[1]FEET ABOVE CORPORATE LIMITS
[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS
[3]THIS WIDTH IS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF SABINA, OH
(CLINTON CO)

FLOODWAY DATA

WILSON CREEK

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

A study published by the SCS (Reference 4) presented flood boundaries for the 100-year flood in and around the Village of Sabina. The SCS study was conducted as part of an environmental impact statement for the Rattlesnake Creek Watershed. The SCS study is in agreement with this study.

A Flood Insurance Rate Map has been printed for Clinton County, Ohio (Reference 8) and is not in agreement with this study due to the more detailed analysis of this study.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the Village of Sabina (Reference 9).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, 4th Floor, Chicago, Illinois 60604.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Ohio, Washington, D.C., March 1981.

2. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Clinton County, Ohio, 1962.

3. Ohio Division of Water, Inventory Report No. 13, Hydrologic Atlas of Annual Precipitation, Temperature, Streamflow, and Water Loss in Ohio, 1962.

4. U.S. Department of Agriculture, Soil Conservation Service, Rattlesnake Creek Watershed - Final Plan and Environmental Impact Statement, 1981.

5. U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, Technical Release No. 20, Computer Program for Project Formulation, Hydrology, May 1965.

6. U.S. Department of Transportation, Federal Highway Administration, Report No. FHWA/RD-86/108, Bridge Waterways Analysis Model: Research Report, J.O. Shearman, W.H. Kirby, V.R. Schneider, and H.N. Flippo, July 1986.

7. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 5 Feet: Sabina, Ohio, 1961, photorevised 1974.

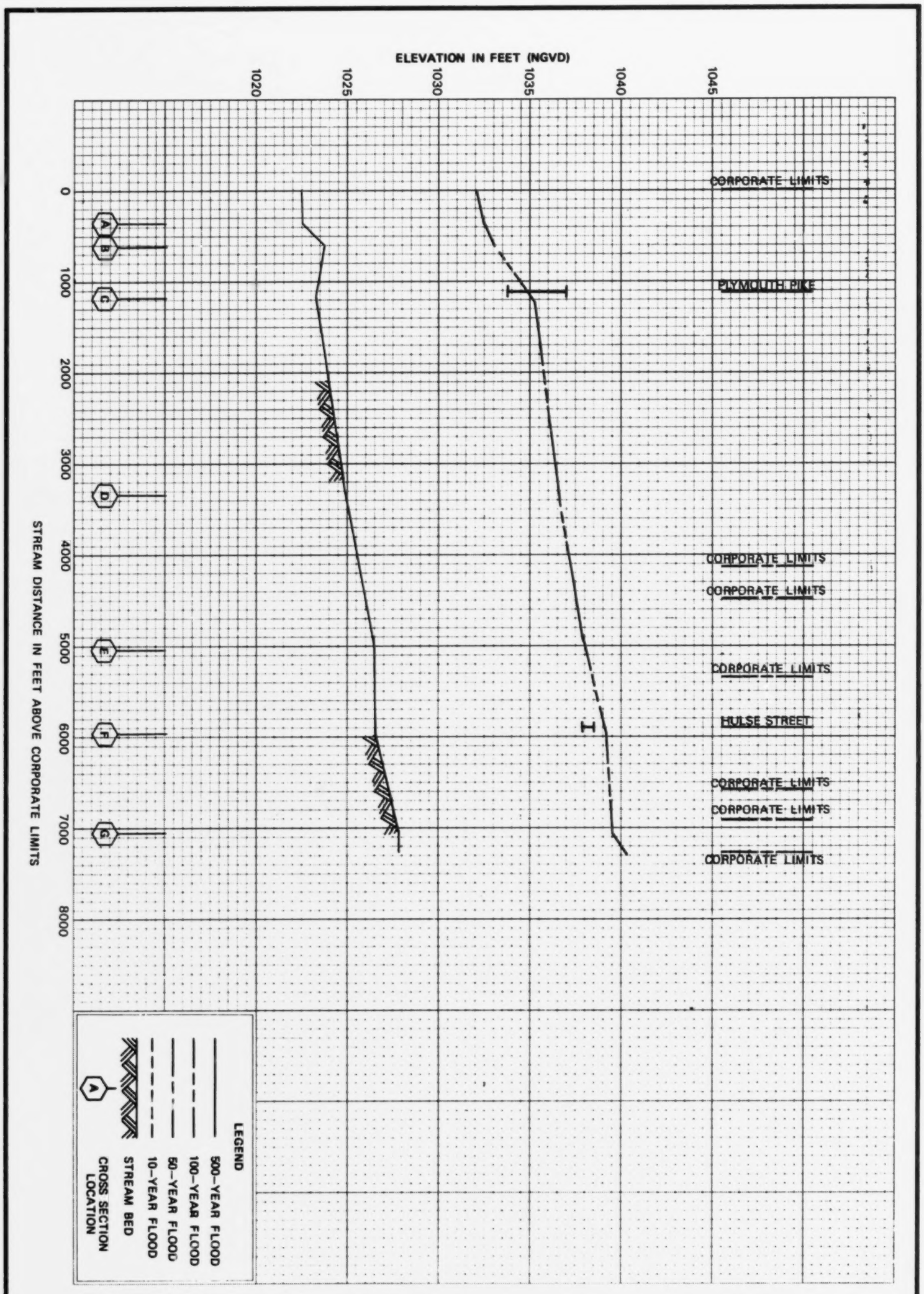
8. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Rate Map, Clinton County, Unincorporated Areas, Ohio, September 1988.

9. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Village of Sabina, Clinton County, Ohio, July 1979.

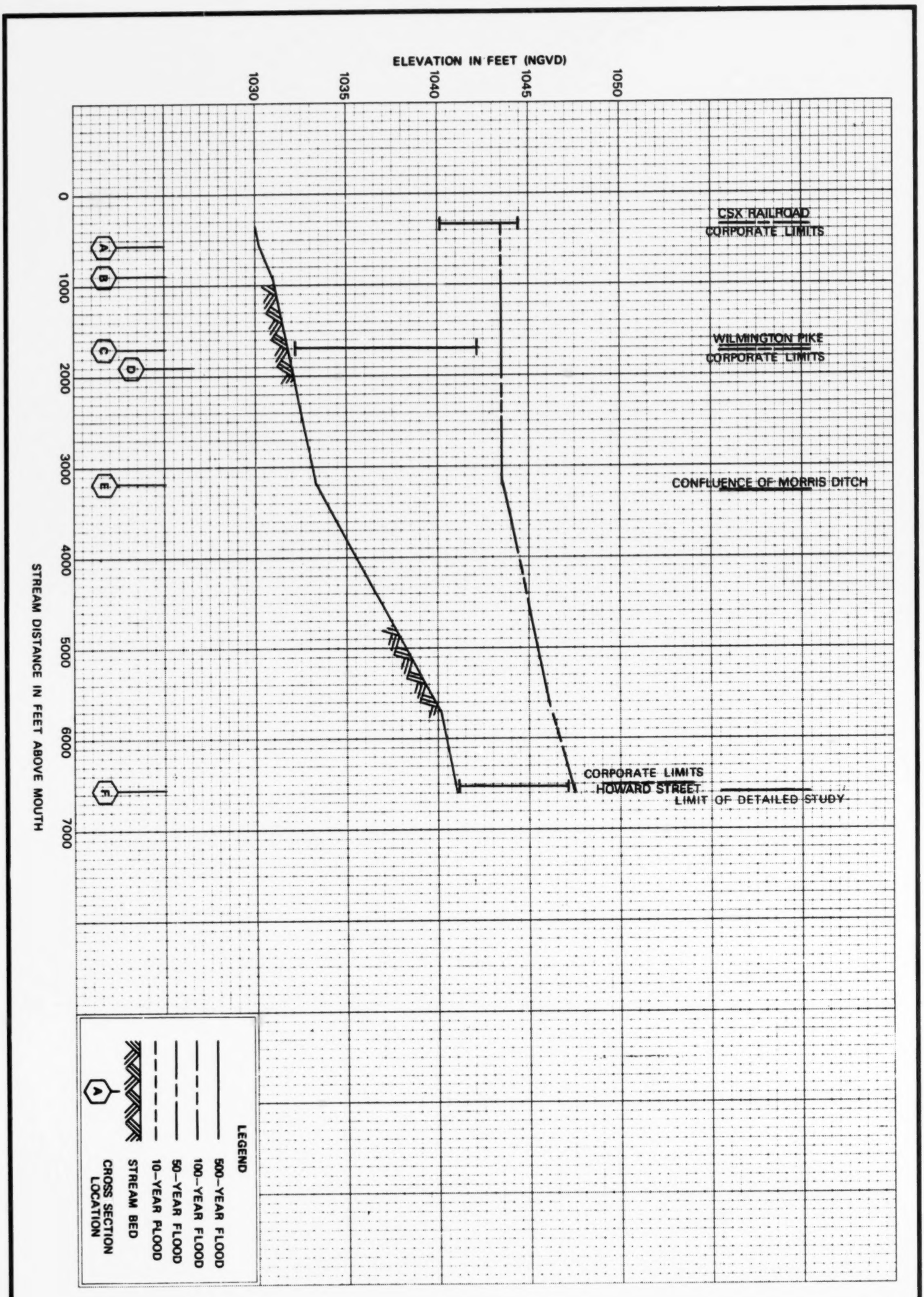
ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1*	0001	1036.90	chiseled square on NE corner of right downstream wingwall of Polk Road bridge over Wilson Creek
2	0001	1042.33	chiseled square on SW corner of east upstream wingwall of CSX railroad bridge over Mary's Fork
3	0001	1041.45	chiseled square on SE corner of Wilmington Pike culvert on Mary's Fork
4	0001	1047.09	chiseled square on SE corner of left upstream abutment of Howard Street culvert on Mary's Fork
5	0001	1037.56	chiseled square on SW corner of right upstream wingwall of Plymouth Pike bridge over Wilson Creek

*outside corporate limits



01P	FEDERAL EMERGENCY MANAGEMENT AGENCY **VILLAGE OF SABINA, OH** (CLINTON CO.)	**FLOOD PROFILES** **WILSON CREEK**



02P	FEDERAL EMERGENCY MANAGEMENT AGENCY **VILLAGE OF SABINA, OH** (CLINTON CO.)	**FLOOD PROFILES** **MARY'S FORK**